Homestead Project
Forest Vegetation Analysis

Idaho Panhandle National Forests

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Introduction

This report describes the existing conditions of forest vegetation, proposed actions, and the effects on forest vegetation from management activities within the Homestead project area.

Analysis Framework: Statute, Regulatory Environment, Forest Plan and Other Direction

Federal Law

The *National Forest Management Act* of 1976, including its amendments to the *Forest and Rangeland Renewable Resources Planning Act* of 1974 state that it is the policy of the Congress that all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans. Both acts also state "insure that timber will be harvested from National Forest System land only where –

(i) there is assurance that such lands can be adequately restocked within five years after harvest;

(ii) that soil, slope, or other watershed conditions will not be irreversibly damaged;

(iii) that protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat; and;

(iv) that the harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber (16 U.S.C. 1604 (g)(3)(E)).

Additionally, NFMA states "ensure that clearcutting, seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an even-aged stand of timber will be used as a cutting method on National Forest System lands only where –

(i) for clearcutting, it is determined to be the optimum method, and for other such cuts it is determined to be appropriate, to meet the objectives and requirements of the relevant land management plan;

(ii) the interdisciplinary review as determined by the Secretary has been completed and the potential environmental, biological, esthetic, engineering, and economic impacts on each advertised sale area have been assessed, as well as the consistency of the sale with the multiple use of the general area;

(iii) cut blocks, patches, or strips are shaped and blended to the extent practicable with the natural terrain;

(iv) there are established according to geographic areas, forest types, or other suitable classifications the maximum size limits for areas to be cut in one harvest operation, including provision to exceed the established limits after appropriate public notice and review by the responsible Forest Service officer one level above the Forest Service officer who normally would approve the harvest proposal: Provided, that such limits shall not apply to the size of areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm; and

(v) such cuts are carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and esthetic resources, and the regeneration of the timber resource.

NFMA also requires that stands of trees shall generally have reached the culmination of mean annual increment of growth prior to harvest, but this does not preclude the use of sound silvicultural systems such thinning and other stand improvement measures; it also allow salvage or sanitation harvest following fire, windthrow, or other catastrophe or within stands in imminent danger of insect and disease attack.

Forest Service Directives

FSM 1921
1921.12 – Vegetation Management Requirements from National Forest Management Act
1921.12e – Maximum Size Limits for Even-Aged Regeneration Harvest

Responsible Officials may establish in supplements of these directives, maximum size limits for areas to be cut in one even-aged regeneration harvest operation according to geographic areas, forest types, or other suitable classifications (16 U.S.C. 1604 (g)(3)(F)(iv)).

1. Limits may not exceed 40 acres with the following exceptions:

a. Sixty acres for the Douglas-fir forest type of California, Oregon, and Washington.

b. Eighty acres for the southern yellow pine types of Alabama, Arkansas, Georgia, Florida, Louisiana, Mississippi, North Carolina, South Carolina, Oklahoma, and Texas.

c. One hundred acres for the hemlock-Sitka spruce forest type of coastal Alaska.

2. Established maximum size openings may be exceeded when carrying out projects and activities after appropriate public notice and opportunity to comment and after review by the officer one level above the Responsible Official.

Forest Plan

The 2015 IPNF Forest Plan provides silviculture standards and guidelines, goals, desired conditions, and objectives that apply to the Homestead project area. A description of how this project complies with the

Forest plan can be found in the Homestead Environment Analysis Appendix A: Consistency with Forest Plan.

Effects Analysis Methodology

Specific Analysis Methodology

Vegetation analysis used field collected data, a 2016 Region 1 (R1) existing vegetation map (VMap), 2017 National Agriculture Imagery Program (NAIP) imagery, and ArcMap Geographical Information System (GIS).

Field sampled vegetation data (FSVeg), also known as common stand exam (CSE) or forest inventories were conducted during the 2015 and 2016 field seasons to measure attributes (e.g. species composition, tree densities, tree age, tree size) of existing forest vegetation. Existing vegetation conditions reflect past natural disturbances and management activities. Data was collected on approximately 4,877 acres encompassing around 74 percent of those acres where proposed activities would occur. Additionally, CSE data was gathered within the project area between 1984-1993 and 2003-2010 on 3,195 acres and 7,611 acres respectively and was utilized as supplemental data in determining old growth and verifying existing forest cover types. Vegetation sampling methodology followed protocols established in the R1 CSE Field Guide. Also, stand assessments (diagnosis) were conducted during the 2017 field season to evaluate resource conditions including insect and disease occurrence. Stand assessments are documented in the project record (PF: VEG-003). Additionally, Forest Health and Protection (FHP) personnel performed site visits during the 2018 field season to gather further information associated with forest insects and disease within the project area. These observations are documented in the Homestead Project Area Forest Health Evaluation CFO-TR-18-014 (PF: VEG-002).

The Forest Vegetation Simulator (FVS), part of the Region 1 (R1) Post-load Processor (PLP), was employed to calculate attributes such as but not limited to: tree volumes; tree height; insect and disease ratings; fire and fuels variables; and stocking and volume levels. FVS is a model used for predicting forest stand dynamics (Dixon, 2002) and is calibrated to unique geographic regions producing individual variants that the user may select. Each FVS variant is calibrated with the major tree species as well as the growth and yield equations for the given geographic regions. The Inland Empire variant is appropriate for the IPNF.

Next, the project area is comprised of three recognized biophysical settings: Warm/Dry; Warm/Moist, and Subalpine. Biophysical settings are used to characterize forest vegetation and are broad groupings of vegetation response units that have been aggregated by factors that regulate disturbance regimes and successional responses (such as habitat types, landform, and other topographic characteristics such as aspect). Within the Homestead project area, 58 percent is classified as subalpine, 40 percent as

warm/moist, and less than 2 percent as warm/dry biophysical setting. For this analysis, changes in vegetation were assessed at the warm/moist biophysical setting level and the project level since 86 percent of proposed treatments occur in the warm/moist biophysical setting and only 2 percent (202 acres) of the subalpine biophysical setting would be affected by the proposed action. The effect to forest vegetation in the subalpine biophysical setting would slightly contribute to effects at the project level.

Spatial and Temporal Context

The spatial analysis area used to develop the existing forest vegetative conditions and to assess direct, indirect, and cumulative effects to forested vegetation includes portions of the Upper, Middle, and Lower Marble Creek sub-watersheds. The project area was used for all measures because it is large enough to assess effects to forest vegetation at the mid-scale landscape and fine scale (stand).

For the purpose of the vegetation analysis, the temporal bounds include a short-term timeframe of less than 5 years and a long-term time frame of 80-90 years. The short-term timeframe allows for assessment of proposed treatments post-treatment. Short-term effects can usually be observed immediately after treatment has been implemented. Long-term timeframe allows for an assessment of tree establishment post-harvest, stand growth over time, and potential future treatment needs (e.g. precommercial thinning).

Incomplete and Unavailable Information

There are no stand examinations recorded for approximately 6 percent (1,074 acres) of the project area. There are no recent (2015-2016) stand examinations for 26 percent (381 acres) where management activities are proposed. VMap was used to characterize existing conditions on the acres that do not have CSEs.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects

Activities that are relevant to the cumulative effects analysis for the silviculture/vegetation resource are those that modify forest vegetation. Timber harvest, precommercial thinning, and other stand improvement activities affect stand structure, species composition and other stand components and thus are relevant to the silviculture/vegetation resource. Fire management activities such as prescribed burning and wildfire suppression, as well as past wildfires are also important in assessing cumulative effects. Past and present road construction provides access for management activities and therefore is also relevant.

Activities such as recreational use, road and trail maintenance of established routes, snowmobiling, small scale mining, in-stream projects, and culvert modification or replacement do not measurably affect the silviculture/vegetation resource and are not relevant to the cumulative effects analysis.

Resource Indicators and Measures

Resilient landscapes maintain a dynamic range of species, vegetation patterns, and patch size distributions that emerge under the constraints of the climate, geology, disturbance regimes, and biota of the area (Stine

et al. 2014). This analysis compares the existing vegetation condition and the outcome of the proposed action to the desired condition specific to the Homestead project area.

Indicators and measures for assessing effects to forest vegetation are discussed below and displayed in **Error! Reference source not found.**. These measurement indicators are based on quantifiable attributes that can be measured pre- and post-treatment to indicate how well desired conditions have been met.

Table 1: Resource condition indicators and measures for assessing effects.

Issue	Indicator or Measure	Source
There is a lack of representation of early seral species across the landscape.	Acres: Number, proportion, and patch metrics of dominance types.	GOAL-VEG-01 FW-DC-VEG-01 FW-DC-VEG-04 FW-DC-VEG-06 FW-OBJ-VEG-01 FW-GDL-VEG-08
There is a deficiency of hetergeneity of forest structure/size class distribution.	Acres: Number, proportion, and patch metrics of forest structure by size class.	GOAL-VEG-01 FW-DC-VEG-02 FW-DC-VEG-04 FW-DC-VEG-05 FW-DC-VEG-11 FW-OBJ-VEG-01 FW-GDL-VEG-08
There has been a homogenization simplification of landscape pattern.	Acres: Number of new openings exceeding 40 acres. Patch metrics of dominance types and forest structure.	FW-DC-VEG-05 FW-STD-TBR-02
Old Growth	Acres: Number and proportion and patch size of existing old growth	FW-DC-VEG-03 FW-STD-VEG-01 FW-GDL-VEG-01 FW-GDL-VEG-02

Forest Cover Types

Tree species are differentially adapted to the physical and biotic environment and the different tolerances of trees species plays a major role in determining forest composition, structure, and function. Major tree species in the Homestead project area include: grand fir (*Abies grandis*); Douglas-fir (*Pseudotsuga menziesii*); subalpine fir (*Abies lasiocarpa*); Engelmann spruce (*Picea engelmannii*); mountain hemlock (*Tsuga mertensiana*); western hemlock (*Tsuga heterophylla*); western larch (*Larix occidentalis*); western red cedar (*Thuja plicata*); western white pine (Pinus *monticola*); whitebark pine (*Pinus albicaulis*); and lodgepole pine (*Pinus contora*).

Species may be classified based on an ecological tolerance of shade. Tolerance is defined as the capacity of trees to grow satisfactorily in the shade of, and in competition with other trees. Shade-tolerant species have the capacity to compete for survival under shaded conditions, whereas shade-intolerant species have the capacity to compete for survival under direct sunlight conditions (Deal, 2018). The existing acreage of stands dominated by shade-intolerant conifers (i.e. western white pine and western larch) is below the

desired condition. A goal of the Homestead project is to increase the proportion of western larch and western white pine across the landscape. Activities which maintain and increase the presence of these species would increase the diversity of conifers within the project area.

Changes in forest cover types is measured by the acres and proportion of dominance groups at the biophysical setting level and the project level. Per the definition in the Forest Plan, a dominance group is determined by the following:

- **Single species** – species that makes up at least 60 percent of the trees per acre or weighted basal area.
- **Species mix** – No single species determination be made.Type of mix is either tolerant or intolerant and determined by what species combination.

Stands classified as shade-tolerant mix (TMIX) were incorporated into either the grand fir/cedar/western hemlock mix or subalpine mix depending on the biophysical setting and species composition.

Forest Structure

Stand structure is the horizontal and vertical distribution of components of a forest stand including the height, diameter, crown layers, stems of trees, snags, and down woody debris (Deal, 2018). The IPNF Forest Plan uses four size classes to broadly describe and quantify stand structure. The four size classes are as follows:

Seedling/sapling: 0.0 – 4.9 inches DBH
Small: 5.0 – 9.9 inches DBH
Medium: 10.0 – 14.9 inches DBH
Large: Greater than or equal 15.0 inches DBH

Openings Larger Than 40 Acres

The proposed action would generate openings in excess of 40 acres. Openings which exceed 40 acres in size would allow treatment unit boundaries to follow existing vegetation patterns and breaks, resulting in a more natural-appearing canopy opening. The Forest Service is required to disclose to the public if individual harvest openings created by even-aged silvicultural practices are proposed that would exceed 40 acres, and to seek Regional Forester approval for the large openings.

Old Growth

The amount and arrangement of existing old growth is measured by the proportion and acres of the Homestead project area consistent with Green et al. (2011) definitions and the minimum and maximum patch size within the project area.

Affected Environment

The Homestead project area encompasses approximately 16,757 acres in the St. Joe Ranger District (SJRD) in the Idaho Panhandle National Forests (IPNF). The project area is also situated in the St. Joe Geographical Area (GA) as defined in the IPNF Forest Plan.

Desired Conditions

A historic range of variability (HRV) was developed for composition (Dominance type or species composition), structure (size class), and landscape pattern to determine historic conditions and provide context for building vegetation desired conditions for the IPNF Forest Plan. HRV is defined as the range of variation in spatial, structural, compositional, and temporal characteristics of ecosystem elements as affected by minor climatic fluctuations and disturbances. The IPNF conducted an analysis using a wide variety of sources and methods to assess historic conditions to develop an HRV. The resulting HRV was found to be consistent with conditions that would improve resistance and resiliency under climate change. This resulted in the ranges for vegetation desired conditions by species and size class presented in the revised Forest Plan. Because it will take many decades to achieve these desired ranges, the desired condition for vegetation is to move towards these ranges. (USDA 2013).

For the Homestead project area, the desired conditions for forest cover types, forest composition, and forest structure are presented for the warm/moist biophysical setting only because eighty-five percent of proposed treatments would occur in the warm/moist biophysical setting.

Existing Conditions

The existing condition of the Homestead project area is a function of past natural disturbances and management activities combined with successional development of forest stands. The existing condition is inclusive of past activities that have affected forest vegetation.

Biophysical Setting

Biophysical settings (BpS) are broad groupings of vegetation response units that have been aggregated by factors that regulate disturbance regimes and successional responses (such as habitat types, landform, and other topographic characteristics, such as aspect); combined with climatic factors such as temperature and moisture gradients. Areas within each of the biophysical setting have similar patterns in potential natural communities, soils, hydrologic function, landform and topography, lithology, climate, and natural processes (e.g. succession and fire regime). The three biophysical settings recognized by the IPNF are: Warm/Dry; Warm/Moist; Subalpine. The Homestead project area is dominated by the subalpine (58%) and warm/moist (40%) biophysical settings with minor amounts of the warm/dry (<2%) (Map 1). The patches of the warm/dry biophysical setting are generally found on steeper slopes with a south-southwest aspect. Scree slopes and bodies of water make up less than one percent of the project area.

Forest Cover Types/Species Composition

Forest cover type describe the dominant tree species in a given stand. Currently, the dominant cover types within the Homestead project area are grand fir, mountain hemlock, and subalpine fir (**Error! Reference source not found.**). Map 2 shows existing forest cover types within the project area. Long-lived seral species (e.g. western white pine, western larch, and whitebark pine) have substantially declined across the St. Joe GA (USDA 1996) as a result of the changes in the role of fire, introduction of white pine blister rust, and past timber harvest practices. Past timber harvesting tended to remove white pine, larch, and ponderosa pine and accelerated succession to stands dominated by mid- to late-successional tree species such as grand fir, subalpine fir, hemlock, and cedar (USDA, 1996). Forest plan desired conditions, relevant to the Homestead project area, provide that more of the forest is dominated by western white pine, western larch, and whitebark pine. Conversely, less of the forest is dominated by grand fir, western hemlock, western red cedar, Douglas-fir, lodgepole pine, and subalpine fir (FW-DC-VEG-01).

Table 2: Existing forest cover type distribution within the Homestead project area.

Forest Cover Type	Acres	Proportion of Homestead Project Area (percent)		Forest Wide Dominance Group	Desired Range (percent)
Mountain hemlock	4,158	25	52	**Subalpine fir mix**	10-20
Subalpine fir	3,516	21			
Engelmann spruce	538	3			
Shade tolerant mix	448	3			
Grand fir	4,625	28	40	**Grand fir/ cedar/western hemlock mix**	6-12
Shade tolerant mix	1,614	10			
Western red cedar	367	2			
Douglas-fir	286	2	2	**Douglas-fir**	12-25
Lodgepole pine	177	1	1	**Lodgepole pine**	3-5
Western larch	98	<1	<1	**Western larch**	10-21
Shade intolerant mix	436	3	3	**N/A**	**N/A**
Transitional forest	356	2	2		
Non-forested	138	<1	<1		
Totals	**16,757**	**100**	**100**		

Table 2 displays the existing distribution of forest cover types in the Homestead project area and the forest wide desired range of forest cover types from the IPNF Forest Plan. When no single species expressed dominance the most appropriate mixed group was assigned as a forest cover type. **Error! Reference source not found.** lists tree species and to which mixed group they are assigned based on shade tolerance. Shade-tolerant species have the capacity to compete for survival under shaded conditions, whereas shade-intolerant species have the capacity to compete for survival under direct sunlight conditions (Deal, 2018).

Table 3: Tree species and their assignment as hardwood, shade-intolerant, or shade-tolerant conifer (Barber et al. 2011).

Species Common Name	Tree Type Assignment
Aspen	Hardwood
Cotton and Poplar	
Paper birch	
Douglas-fir	Shade-intolerant
Lodgepole pine	
Ponderosa pine	
Western larch	
Western white pine	
Whitebark pine	
Engelmann spruce	Shade-tolerant
Grand fir	
Mountain hemlock	
Subalpine fir	
Western hemlock	
Western red cedar	

Within the Homestead project area, the warm/moist biophysical setting is dominated by the grand fir/cedar/western hemlock mix. **Error! Reference source not found.** displays the current and desired distribution of forest cover types within the warm/moist biophysical setting. Desired ranges represent the desired future condition at the forest-wide scale. Lodgepole pine and subalpine mix represented in Table 4 generally occur in transition zones between the warm/moist and subalpine biophysical settings.

Table 4:Acres and proportions of dominance groups within the warm/moist biophysical setting in the Homestead project area.

Dominance Group (DG)	Acres	Existing Proportion of Warm/Moist DG (percent)	Warm/Moist Desired Ranges (percent)
GF/C/WH	6,113	91	10-20
DF	228	3	14-28
WL	41	1	12-25
WP	0	0	30-60
LP	89	1	N/A
IMIX	210	3	N/A
Subalpine mix	29	<1	N/A
Non-forested	20	<1	N/A
Total	6,730	100	

GF/C/WH = grand fir/cedar/western hemlock mix; DF = Douglas-fir; WL = western larch; WWP = western white pine; LP = lodgepole pine; IMIX = shade intolerant mix; SF mix = subalpine fir mix.

As displayed in Table 4, the grand fir/cedar/western hemlock mix is significantly over represented while all other types are significantly under represented within the project area. There is a lack of representation of early seral, shade-intolerant, drought-and fire-tolerant, insect/disease resistant species dominance types

(e.g. white pine, western larch, whitebark pine). Forest plan desired conditions, relevant to the Homestead project area, provide that more of the forest is dominated by western white pine, western larch, and whitebark pine. Conversely, less of the forest is dominated by grand fir, western hemlock, western red cedar, Doulas-fir, lodgepole pine, and subalpine fir (FW-DC-VEG-01).

Forest Structure

The dominant size class within the Homestead project area is the large size class. Approximately 69 percent of the project area is in the large size class and less than one percent is in the seedling/sapling size class (Map 3). **Error! Reference source not found.** displays the current size class distribution at the project scale and the desired ranges.

Table 5: Existing acres and proportions and desired ranges for forest structure (by size class) at the project level.

Size Class	Acres	Proportion (percent)	Desired Range (percent)
Large (≥15.0" DBH)	11,627	69	31-61
Medium (10.0"-14.9" DBH)	4,324	26	15-25
Small (5.0" – 9.9" DBH)	288	2	8-16
Seedling/Sapling (0 – 4.9" DBH	23	<1	15-29
Transitional Forest	357	2	N/A
Non-forested	138	<1	N/A
Total	**16,757**	**100**	

A similar representation occurs at the biophysical setting scale. **Error! Reference source not found.** displays the current size class distribution in the warm/moist biophysical setting. As depicted in Table 6, approximately 76 percent of the warm/moist biophysical setting is dominated by the large size class while the seedling/sapling size class is not represented.

Table 6: Existing acres and proportions and desired ranges for forest structure (by size class) for the warm/moist biophysical setting.

Size Class	Acres	Proportion (percent)	Desired Range (percent)
Large (≥15.0" DBH)	5,175	76	31-61
Medium (10.0"-14.9" DBH)	1398	21	15-25
Small (5.0" – 9.9" DBH)	137	2	8-16
Seedling/Sapling (0 – 4.9" DBH	0	0	15-29
Non-forested	20	<1	
Total	**6,730**	**100**	

As illustrated in Tables 5 and 6, the large size class exceeds the desired range and the medium size class is generally within or slightly exceeds the desired range. There is a lack of early-seral forest structure, seedling/sapling and small trees. Early succession is the only period when tree canopies do not dominate the forest site, and so this stage can be characterized by high productivity of plant species (including herbs and shrubs), complex food webs, large nutrient fluxes, and high structural and spatial complexity (Swanson et al., 2011).

Openings/Patch Size

Historically, fire was the primary disturbance agent throughout most Rocky Mountain ecosystems (Peet 2000), but insects and pathogens were also important. Major fire years occur most commonly during regional summer droughts. Lightning storms and wind contribute to the likelihood of a major fire year. During major fire years, stand-replacing fires were commonly on the order of tens of thousands of acres, with some individual fires 100,000 acres or larger (USDA, 1996).

Because of the success of fire suppression efforts over the last several decades, regeneration timber harvests are the current predominant stand-replacing disturbance process. Regeneration harvest systems (clearcut, seed-tree, and shelterwood) followed by prescribed fire can emulate some of the stand-replacing fire, but not all of them. However, some regeneration harvests conducted prior to the mid-1990s tended to create unnaturally uniform conditions and did not leave the scattered residual snags, residual live tree patches, and scattered fire-tolerant large live trees (larch and ponderosa pine) that were characteristic of historic fires. In addition, the size of these regeneration harvest units (2 to 40 acres) were much smaller than patches created by historic, natural-fire regimes (USDA 2013).

Currently, the project area is lacking heterogeneity in terms of patches and patch sizes. As depicted in Map 3, a majority of the project area is a contiguous patch of large trees with various size patches of medium size trees. Patches of small trees are the result of past timber harvest approximately 30 years ago and are underrepresented as are patches of the seedling/sapling size class.

Forested landscapes that contain little heterogeneity promote the creation of large contiguous areas susceptible to bark beetles and other forest insects (Fettig et al. 2007). Forest plan desired conditions for the warm/moist biophysical setting are patch sizes of 100 to 300 acres in size, with large patch sizes on steep topography (FW-DC-VEG-11). Overall, the Homestead project area is outside of the desired conditions for forest composition, forest structure, patch size, and associated landscape pattern (FW-DC-VEG-01, FW-DC-VEG-02, FW-DC-VEG-11).

Insects and Disease

Of forested land in the Homestead project area, 1,188 acres (7.2%) are rated to have high root disease hazard; 12,550 acres (76.3%) are rated to have moderate root disease hazard; and 1,991 acres (12.1%) are rated to have low root disease hazard. Most proposed treatment areas have a moderate hazard rating (**Error! Reference source not found.**). Root disease hazard indicates a probability of root disease

occurring and the potential impact possible from root disease. Those areas designated as high hazard have the greatest tendency for severe root disease to occur on the ground and for significant losses to occur, and those with moderate root disease hazard have potential for root disease to be an agent of change (Pederson and McKeever 2018).

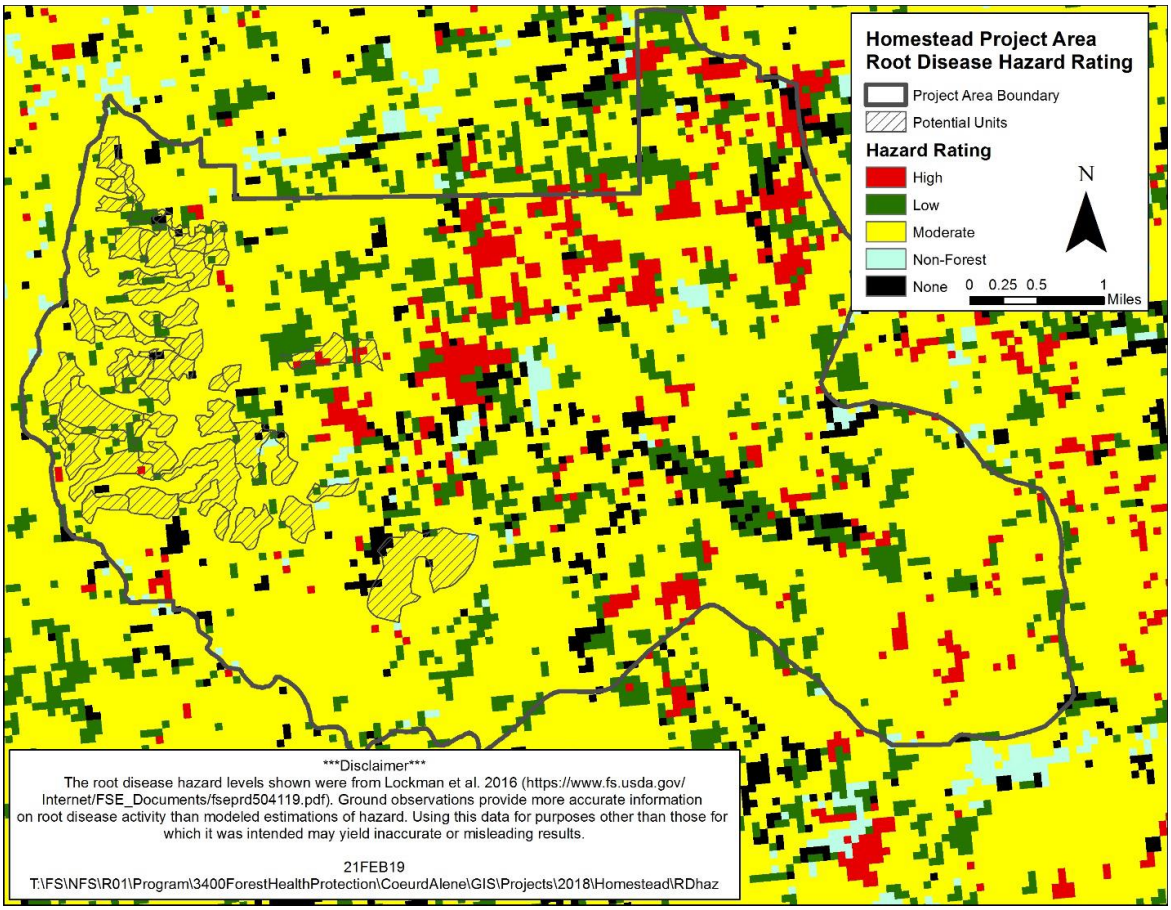

Figure 1: Root disease hazard within the Homestead project area (Pederson and McKeever 2018).

Existing forest health conditions were assessed through CSE inventory, stand diagnosis conducted by District foresters and silviculturists, and evaluations conducted by FHP personnel. The following is a list of significant damaging agents observed within the Homestead project area (Pederson and McKeever 2018).

- Root disease complex: Armillaria root disease (*Armillaria ostoyae*) in Douglas-fir and grand fir; Laminated root disease (*Coniferiporia sulphurascens*, a.k.a. *Phellinus sulphurascens*) in grand fir, Engelmann spruce; fir-type Heterobasidion root disease (Heterobasidion occidentale; "annosus root disease") in grand fir.
- White pine blister rust (*Cronartium ribicola*) affecting western white pine.
- Douglas-fir beetle (*Dendroctonus pseudotsugae*) in Douglas-fir.
- Fir engraver (*Scolytus ventralis*) in grand fir.

Also, based on field observations and FHP data, approximately 841 acres (69%) of proposed harvest areas treatment had observed root disease infections. Map 4 displays the proposed harvest areas and those areas where root diseases were detected. Forest plan desired conditions for root disease fungi, such as Armillaria and Phellinus are that they are killing fewer trees as the composition of the forest trends toward less susceptible tree species such as western larch and western white pine (FW-DC-VEG-06). The FHP staff found that the most common and destructive forest health problems observed were root diseases and associated bark beetles. Armillaria root disease was a primary cause of mortality in grand fir and Douglas-fir at observation points within the project area (Pederson and McKeever 2018). Signs and symptoms of Armillaria are difficult to detect aboveground. The pattern of fungal infection and spread creates a spatial dynamic where healthy and diseased trees occur as neighbors and where infected trees can be outgrown by healthy neighbors because disease reduces height, diameter, and volume growth. Infected trees are faced not only with impaired root systems and activation of costly host defense, but also with other important constraints such as competition for light and maintaining water balance, all of which affect photosynthesis and growth (Cruickshank and Filipescu 2012). Forest plan desired conditions for forest insects are that insects, such as Douglas-fir beetle, mountain pine beetles, fir engraver beetle, and western spruce budworm, are generally causing less tree mortality. Impacts from the non-native fungus that causes the white pine blister rust disease are reduced as the abundance of rust-resistant western white pine and whitebark pine increases (FW-DC-VEG-06).

The FHP staff suggested the following activities to move the project area toward improved forest health and resiliency to diseases and insects (Pederson and McKeever 2018):

- Regeneration harvests in mixed conifer stands dominated by root disease-susceptible hosts, combined with planting, of more root disease-tolerant species (western larch and western white pine).
- Residual shelterwood or seed trees should favor species more tolerant of root disease (pine species or western larch).
- When planting western white pine, use seedlings genetically improved for resistance to white pine blister rust.
- Thinning might be appropriate in units, or portions of units, with sufficient healthy western larch.

Old Growth

Currently, approximately 5,566 acres (33%) in the Homestead project area meet or exceed the minimum quantifiable old growth criteria (Green et al. errata corrected 2011). Around 18 percent (1,081 acres) is situated in the warm/moist biophysical setting and about 82 percent (4,485 acres) is in the subalpine biophysical setting (Map 5). **Error! Reference source not found.** and **Error! Reference source not found.** display patch size metrics for old growth within the warm/moist biophysical setting and **Error! Reference source not found.** and **Error! Reference source not found.** display patch size metrics for old growth within the subalpine biophysical setting. Old growth stands in the warm/moist biophysical setting are dominated by grand fir or western red cedar or a combination of shade-tolerant conifers. Old growth

in the subalpine biophysical setting is dominated by either subalpine fir, Engelmann spruce, mountain hemlock or a combination of shade tolerant species.

Table 7: Distribution of patch sizes for old growth in the warm/moist biophysical setting.

Patch Size	Existing Number of Patches
<25	1
25-50	5
50-100	1
100-200	2
200-500	2
>500	0

Table 8: Patch metrics for old growth in the warm/moist biophysical setting.

Mean Patch Size (acres)	Median Patch Size (acres)	Minimum Patch Size (acres)	Maximum Patch Size (acres)
98	46	12	384

Table 9: Distribution of patch sizes for old growth in the subalpine biophysical setting.

Patch Size	Existing Number of Patches
<25	1
25-50	1
50-100	3
100-200	1
200-500	0
>500	2

Table 10: Patch metrics for old growth in the subalpine biophysical setting.

Mean Patch Size (acres)	Median Patch Size (acres)	Minimum Patch Size (acres)	Maximum Patch Size (acres)
560	86	17	2,816

Existing Condition Summary

Forest composition within the Homestead project area is dominated by the subalpine fir mix (52%) and grand fir/cedar/western hemlock mix (40%) dominance groups. Root disease fungi, such as Armillaria and Heterobasidian, and associated bark beetles (e.g. Douglas-fir beetle and fir engraver) are present and causing various levels of mortality as is white pine blister rust, affecting western white pine and whitebark pine. There is a lack of representation of early seral, shade-intolerant, drought- and fire-

tolerant, insect/disease resistant species dominance types (e.g. white pine, western larch, and whitebark pine). Also, there is a deficiency of successional stages within the project area. Currently, approximately 69% of the Homestead project area is dominated by the large tree size class (≥15.0" DBH) and only 2-3% is comprised of the seedling/sapling and small tree (5.0"-9.9" DBH) size classes. The pattern, including patch size, of successional stages within the project area is relatively homogenous due to the low diversity of vegetation composition and structure. Overall, the Homestead project area is outside of the desired conditions for forest composition, forest structure, patch size, and associated landscape pattern.

Project Information Related to Forest Vegetation/Silviculture

Activities under the Proposed Action

A full description of the proposed action is provided in the Homestead EA. In summary, the vegetation management activities proposed would regenerate approximately 1,170 acres, primarily through even-aged regeneration harvest followed by tree planting. The harvested sites would include various levels of tree retention. Retained trees would provide seed to supplement proposed planting, future snags, wildlife habitat, and coarse woody debris for soil productivity.

Upon completion of the proposed activities the regenerated acreage would become seedling/sapling size stands with planted western larch and rust resistant western white pine in addition to rust resistant whitebark pine on selected sites. Natural conifer regeneration, primarily comprised of grand fir, Douglas-fir, western red cedar, and western hemlock would also contribute to the initial species composition of the regenerated stands.

Site Specific Design Features and Mitigation Measures

To minimize the visual impact of painted tree boles following completion of the project as seen from FR 321, methods such as cut-tree marking would be utilized in units 1A, 2A, 12, 13, 14,20, 21, 25A, 25B, 26, and 28. Additionally, dots would be utilized for boundary trees in place of horizontal lines.

Monitoring

Monitoring is the process of periodically and systematically gathering and analyzing information to understand trends over time. Even without a formal monitoring plan, a series of "checks and balances" occurs throughout project implementation and long after activities are complete.

During sale layout marking crews follow the unit boundaries, design features, and harvest prescriptions identified by the interdisciplinary team. Small adjustments are made as necessary based on site conditions and documented in the project file.

The revised Forest Plan (USDA 2015) documents a system to monitor and evaluate Forest activities, addressing the most critical components for informed management of the Forest's resources within the financial and technical capability of the agency. Monitoring is conducted over the entire Forest on a periodic basis, and the monitoring results are used to guide future projects. Activities or trends (such as forest species composition) may be selected for monitoring; results of such monitoring would be reported as directed under the Forest Plan.

Environmental Consequences

Effects to Forest Vegetation

Direct and Indirect Effects

Forest Cover

Approximately 58% of the project area is classified as subalpine biophysical setting and 40% is classified as warm/moist biophysical setting. About 86% of proposed treatments would occur in the warm/moist biophysical setting and 14% would occur in the subalpine biophysical setting. Table 12 displays the desired future conditions for forest cover types in the warm/moist biophysical setting at the Forestwide scale in comparison to the existing forest cover types at the project scale. As can be seen in Table 11, the grand fir/western red cedar/ western hemlock (GF/C/WH) mix is dominant within the warm/moist biophysical setting, making up 91 percent. There is an abundance of the two most susceptible hosts of Armillaria root disease, Douglas-fir and grand fir, within the project area (Pederson and McKeever 2018). Douglas-fir can be found as a species component in forest cover types in the GF/C/WH mix dominance group and scattered representation in the other dominance groups. No stands within the project area are dominated by western white pine. The shade intolerant mix (IMIX) is primarily comprised of western larch and Douglas-fir, with scattered western white pine and minor amounts of grand fir and western red cedar. Scattered whitebark pine is present at higher elevations in the subalpine biophysical setting. Whitebark pine is a tree species that is grouped with other species (subalpine fir, Engelmann spruce, mountain hemlock, and subalpine larch) to form the subalpine fir mix dominance group (USDA, 2013).

Less than 8 percent of the project area is dominated by shade-intolerant species dominance types. There is a lack of representation of shade-intolerant dominance groups within the project area. The species to decrease are relatively drought-and fire-intolerant. Changing the forest composition towards the desired ranges would increase resistance and resiliency, reducing the effects from drought, fire, insects, disease, and climate change (McKenzie et al. 2009).

The proposed action is intended to establish new stands of long-lived, early seral, shade-intolerant species on approximately 1,170 acres. Stands regenerated under the proposed action would be planted with a mix of western larch and rust resistant western white pine. Proportions of western larch and western white

pine planted would vary and depend on pre-planting surveys, habitat types and site conditions. For this analysis, stands were evaluated with a higher proportion being western larch. Pocket gopher control would be utilized if pre-planting inspection or first-, third-, or fifth-year survival surveys indicate that gopher related herbivory has caused a need. Within seed-tree and shelterwood regeneration units, natural regeneration is expected due to residual seed and shelter trees of western larch, and to a lesser degree, western white pine to supplement planted trees. Existing snags which meet minimum snag requirements and do not pose a safety concern would be retained.

Commercial thinning, an intermediate treatment, would occur on 49 acres in stands currently within the GF/C/WH dominance group. Intermediate harvest as a primary treatment activity would not be effective in the Homestead project area because it would exacerbate root disease effects (through the buildup in the stumps and root systems of the fungi that cause root disease), lead to heavy blowdown, and encourage advanced regeneration of grand fir and Douglas-fir. Where commercial thinning is proposed (less than 0.3 percent on the project area, and 4 percent of harvest acres), there is already a healthy component of the desired shade-intolerant conifers. Commercial thinning would favor these more root disease-resistant species (western larch and western white pine) while retaining some shade-tolerant/root disease susceptible conifers. The retained shade-tolerant conifers could contribute to snag recruitment and down woody debris within these stands if infected with root disease. Approximately 202 acres in the subalpine biophysical setting would be treated to restore whitebark pine. These treatment acres would not involve any tree harvesting. Prescribed fire would be the primary tool used to reduce the presence of competing vegetation and prepare sites for planting of rust-resistant whitebark pine. Hand thinning would be incorporated as a protection measure around existing whitebark pine to minimize damage or potential loss.

Table 11: Pre- and post-treatment acres and proportions of dominance groups at the [Homestead] project level.

Forest Cover Type	Existing Acres	Existing Proportion (percent)	Post-Treatment Acres	Post-Treatment Proportion of Homestead Project Area (percent)		Forest Wide Dominance Group	Desired Range (percent)
Mountain hemlock	4,158	25	4,158	25	52	**Subalpine fir mix**	10-20
Subalpine fir	3,516	21	3,516	21			
Engelmann spruce	538	3	538	3			
Shade tolerant mix	448	3	448	3			
Grand fir	4,625	28	3430	20	32	**Grand fir/ cedar/western hemlock mix**	6-12
Shade tolerant mix	1,614	10	1,614	10			
Western red cedar	367	2	367	2			
Douglas-fir	286	2	286	2	2	**Douglas-fir**	12-25
Lodgepole pine	177	1	172	1	1	**Lodgepole pine**	3-5
Western larch	98	<1	1,268	8	8	**Western larch**	10-21
Shade intolerant mix	436	3	466	3	3	**N/A**	**N/A**
Transitional forest	356	2	356	2	2		
Non-forested	138	<1	138	<1	<1		
Totals	**16,757**			**100**	**100**		

The proposed action would increase the amount of shade-intolerant western larch, western white pine, and whitebark pine within the project area (**Error! Reference source not found.**) and within the warm/moist biophysical setting (**Error! Reference source not found.**). As depicted in **Error! Reference source not found.**, the amount of the warm/moist biophysical setting classified as GF/C/WH mix would decrease by 1,195 acres via 1,146 acres of regeneration harvests and 49 acres of commercial thinning. Lodgepole pine would decrease by about 5 acres and IMIX would decrease by approximately 19 acres.

Table 12: Pre- and post-treatment acres and proportions of dominance groups on sites classified as warm/moist biophysical setting in the Homestead project area.

Dominance Group	Existing Acres	Existing Percent	Desired Range (Percent)	Post-Treatment Acres	Post-Treatment Percent
GF/C/WH	6,113	91	10-20	4,918	73
DF	228	3	14-28	228	3
WL	41	1	12-25	1,211	18
WWP	0	0	30-60	0	0
LP	89	1	N/A	84	1
IMIX	210	3	N/A	240	4
SF mix	29	<1	N/A	29	<1

Non-forested	20	<1	N/A	20	<1
Total	6,730	100		6,730	100

GF/C/WH = grand fir/cedar/western hemlock mix; DF = Douglas-fir; WL = western larch; WWP = western white pine; LP = lodgepole pine; IMIX = shade intolerant mix; SF mix = subalpine fir mix.

Table 13: Change in dominance group under the proposed action in the warm/moist biophysical setting.

Treatment Type	Existing Dominance Group	Acres Treated	Post-Treatment Dominance Group
Regeneration Harvests	GF/C/WH	1,146	WL
	IMIX	19	WL
	LP	5	WL
Total		**1,170**	
Commercial Thin	GF/C/WH	49	IMIX
Overall Total		**1,219**	

The proposed action would increase heterogeneity associated with forest cover patch metrics. Management activities would create openings larger than 40 acres. Harvesting large patches of the GF/C/WH dominance type and converting them to early seral shade-intolerant conifers would increase the number of patches classified as western larch. The mean and maximum patch size of western larch would immediately increase relative to the existing condition (**Error! Reference source not found.**).

Table 14: Estimated pre- and post-treatment metrics for forest cover types in the warm/moist biophysical setting.

Dominance Group	Existing Number of Patches	Existing Mean Patch Size (acres)	Existing Maximum Patch Size (acres)	Number of Patches Post-Treatment	Mean Patch Size Post-Treatment (acres)	Maximum Patch Size Post-Treatment (acres)
GF/C/WH	2	3,057	5,911	11	445	2,261
DF	13	18	118	13	18	118
WL	1	41	41	18	68	289
WWP	0	0	0	0	0	0
LP	9	10	48	9	9	48
IMIX	8	26	108	11	22	108
SF mix	2	14	17	2	14	17

The proposed action would diversify extensive homogenous patches of forests dominated by species that are very susceptible to disturbance agents. The number of patches of the GF/C/WH dominance group would increase. The mean and maximum size for this dominance group would decrease. Lodgepole pine

mean patch size would slightly decrease since a small portion of an existing stand would be harvested and planted with a mix of western larch and western white pine. Since portions of an existing stand classified as IMIX are proposed to be regenerated, the number of IMIX patches would slightly increase while the mean patch size would somewhat decrease. No stands classified as Douglas-fir or subalpine mix in the warm/moist biophysical setting would be treated, therefore there is no change to their respective patch metrics.

Overall, the proposed action would increase relative representation of early seral, shade-intolerant, drought- and fire-tolerant insect/disease species dominance types (e.g. white pine, western larch, and whitebark pine). Planting would directly transition harvested acres to the western larch dominance type with western white pine as a minor component. Changing species composition from late-seral to early-seral species would increase resilience to insects and disease (Jain and Graham, 2005). Proposed treatments would effectively begin to increase the amount of western larch and western white pine within the project area, trending toward the desired condition. However, gopher abatement may be required to ensure successful regeneration establishment in some portions of the proposed regeneration harvest units. It is anticipated that over the short term, natural regeneration would further influence species composition. There would be additional western larch and western white pine natural regeneration to supplement planted acres due to residual seed and shelter trees. Also, it is expected that there would be some regeneration of grand fir and western red cedar in addition to Douglas-fir, due to the proximity of stands dominated by these species. Stands may transition into mixed stands over time where western larch is a component, but other species have become established and share presence. The proposed action would trend the forest composition in a direction consistent with the Forestwide desired conditions and those for the warm/moist biophysical setting (EA, Appendix D).

Forest Structure

Under the proposed action, size classes within the Homestead project area would trend towards the desired condition, at the project level (**Error! Reference source not found.**) and at the biophysical setting level (**Error! Reference source not found.**).

Table 15: Existing and post-treatment size class distribution at the project level.

Size Class	Existing Acres	Existing Percent	Desired Range (Percent)	Post-Treatment Acres	Post-Treatment Percent
Large (≥15.0" DBH)	11,627	69	31-61	10,639	63
Medium (10.0" – 14.9" DBH)	4,324	26	15-25	4,154	25
Small (5.0" – 9.9" DBH)	288	2	8-16	276	2
Seedling/Sapling	23	<1	15-29	1,193	7
Transitional Forest	357	2	N/A	357	2
Non-forested	138	<1	N/A	138	<1
Total	16,757	100		16,757	100

Table 16: Existing and post-treatment size class distribution at the warm/moist biophysical setting level.

Size Class	Existing Acres	Existing Percent	Desired Range (Percent)	Post-Treatment Acres	Post-Treatment Percent
Large (≥15.0" DBH)	5,175	76	31-61	4,187	62
Medium (10.0" – 14.9" DBH)	1,398	21	15-25	1,228	18
Small (5.0" – 9.9" DBH)	137	2	8-16	125	2
Seedling/Sapling	0	0	15-29	1,170	18
Non-forested	20	<1	N/A	20	<1
Total	6,730	100		6,730	100

Regeneration harvests (1,170 acres) would substantially increase the seedling/sapling size class, which is not represented at the stand level, to within the desired range at the biophysical setting level. At the warm/moist biophysical setting level the large size class would see a correlated decrease in acres and be close to the upper limit of the desired range post treatment. The medium size class would see a slight decrease and remain within the desired range. The small size class would slightly decrease where proposed treatments include portions of these stands where the general size of trees is at the upper end of the size class (7.0"-9.9" DBH). The proposed action would increase heterogeneity in the project area by increasing the amount of early-seral successional stages. Those areas where commercial thinning is proposed would not see an immediate shift to the next larger size class.

Within regeneration harvests, various levels of reserve trees would be left. In addition to the retention of individual trees (seed and shelter trees), reserve trees would be retained centered on existing large trees, snags, seeps, and other unique structural or habitat features, creating reserve areas. These reserve areas would contribute to future snag recruitment and coarse woody debris. It is desirable that reserve trees are

comprised of species that tend to be most persistent such as western larch and cedar. Additionally, tree retention would be utilized to fulfill Scenic Integrity Objectives (SIOs). The retention of individual and groups of trees would contribute to structural (vertical and horizontal) heterogeneity. Also, the change in structure would also modify wildfire behavior by reducing horizontal and vertical fuel continuity relative to existing stand structure in addition to canopy density (EA p. 44, Fire and Fuels Summary).

The potential retention of shade-tolerant conifers in reserve areas may contribute natural regeneration of these conifers over time as stands become more developed. Over the next 10-20 years seedlings would transition into sapling size trees and eventually transition into the small size class after approximately 35 years. Commercial thinning would decrease competition for limited resources and increase the vigor of residual trees. These stands would transition into the next size class sooner than without treatments.

There would be increased heterogeneity in size class patch metrics. **Error! Reference source not found.** displays the existing and estimated post-treatment patch metrics for size classes in the warm/moist biophysical setting. The number of patches and the mean and maximum patch sizes of the seedling/sapling size class would all increase. The large and medium size classes would see an increase in the number of patches and a decrease in mean and maximum patch sizes as a result of the proposed action. The proposed whitebark pine treatments would create two openings totaling 202 acres in the subalpine biophysical setting, contributing to an increase in the seedling/sapling size class in the project area.

The proposed action would result in large, distinguishable patches, with residual structural diversity within due to the retention of seed and shelter trees in addition to the reserve trees. Proposed treatments would trend the forest structure in a direction consistent with the desired conditions for the warm/moist biophysical setting.

Table 17: Comparison of existing and estimated post-treatment patch metrics for size classes in the warm/moist biophysical setting.

Size Class	Existing Number of Patches	Existing Mean Patch Size (acres)	Existing Maximum Patch Size (acres)	Number of Patches Post-Treatment	Mean Patch Size Post-Treatment (acres)	Maximum Patch Size Post-Treatment (acres)
Large (≥15.0" DBH)	2	2,587	4,743	8	521	1,665
Medium (10.0" – 14.9" DBH)	21	66	478	31	40	478
Small (5.0" – 9.9" DBH)	12	11	23	12	8	23
Seedling/Sapling	0	0	0	17	70	289

Opening Size

Timber harvesting under the proposed action would generate 7 total openings greater than 40 acres in the warm/moist biophysical setting (**Error! Reference source not found.**). These openings represent early successional stages in stand development. able displays the patches greater than 40 acres created under the proposed action. Forest Service Policy (FSM 2471.1) directs land managers to normally limit the size of harvest openings created by even-aged regeneration methods to 40 acres or less. However, exceptions to the 40 acre opening limitation are allowable with Regional Forester approval.

The desired condition for the warm/moist biophysical setting includes patch sizes that range from 100-300 acres in size and for the subalpine biophysical setting patch sizes generally range from 50-2,500 acres in size. Openings which exceed 40 acres in size would allow for the reduction of root disease hazard by matching the scale and spatial extent of the existing condition. Currently, 76 percent of the project area is rated to have moderate root disease hazard (Pederson and McKeever 2018) and approximately 69 percent (841 acres) of proposed treatment areas have various levels of observed root disease infection. Openings greater than 40 acres in size would promote a mosaic of species diversity and increase early-seral species representation within the project area, reducing those species most susceptible to root disease. Also, larger openings would allow treatment unit boundaries to follow existing vegetation patterns and breaks. Openings of various sizes would increase the heterogeneity associated with the pattern of successional stages within the project area relative to existing conditions.

Table 18: Patches created in the warm/moist biophysical setting greater than 40 acres in size.

Biophysical Setting	Patch Number	Patch Size (acres)
Warm/Moist	1	274
Warm/Moist	2	255
Warm/Moist	3	208
Warm/Moist	4	78
Warm/Moist	5	60
Warm/Moist	6	53
Warm/Moist	7	40

Old Growth

There would be no direct effect to old growth under the proposed action. None of the proposed activities would occur in stands that currently meet minimum old growth criteria. Within the warm/moist biophysical setting approximately 3,286 acres, where no treatments are proposed, could contribute to an increase in future patch size and the amount of old growth. These acres are dominated by shade-tolerant

conifers in the large size class. These stands generally meet the minimum basal area criteria but do not have enough large trees meeting the minimum age requirements.

The proposed vegetation management activities would indirectly affect the species composition and potential forest types of future old growth if planted trees within harvested areas become established and survive to maturity. This would result in an increase in the diversity of old growth cover types compared to current conditions. Also, the proposed action would reduce the potential for stand replacing wildfire, in the short term, to affect existing old growth. Where proposed harvest activities are adjacent to existing old growth stands the potential for fire spread into old growth stands would be reduced due to the modification of existing fuels. Over time though, without disturbance (via management or natural), stand densities would gradually increase as would canopy cover and the potential for a stand replacing fire to affect old growth stands would increase.

Increasing the potential for western white pine and western larch to occur within future old growth as well as improving resistance to disturbance is in alignment with the forest plan desired conditions (Appendix A: Consistency with Forest Plan).

Cumulative Effects

Within the Homestead project area, Forest Service activity records indicate approximately 596 acres of even-age regeneration harvests have been completed since 1964. These regeneration harvests ranged in size from 3 to 75 acres, averaging about 20 acres. Reforestation activities after regeneration harvests planted either combinations of or single species including western larch, western white pine, Douglas-fir, and Engelmann spruce. Generally, white pine blister rust, selective harvesting of blister rust infected trees, and natural succession to shade tolerant species have collectively contributed to the decline of white pine. Blister rust-resistant white pine stock became readily available in the mid 1980's. Around 260 of the 596 acres of regeneration harvests occurred prior to 1980 and therefore could not be planted with rest-resistant white pine stock.

Secondly, intermediate treatments have occurred on about 1,522 acres within the project area since 1955. Intermediate treatments are designed to enhance growth, quality, vigor, and composition of a stand after establishment or regeneration and prior to final harvest (Deal, 2018). Intermediate treatments include commercial and precommercial thinning, improvement, liberation, salvage, and sanitation cuts. Additionally, pruning has been completed on about 272 acres. Pruning occurs on western white pine to reduce the risk of fatal blister rust infections. The fact that pruning was completed indicates that white pine was not only planted but has survived in high enough quantities to warrant pruning, which facilitates further survival.

Recent natural disturbances have also occurred within the project area. In 2015 the Breezy and Marble fires took place affecting approximately 100 and 718 acres respectively. Portions of these affected areas

have been salvaged and reforested, contributing to past actions. Tree species planted include western larch, western white pine, Engelmann spruce, and Douglas-fir.

Currently, the primary activities occurring within the project area include fuelwood gathering, Christmas tree cutting, and recreating. These activities generally have little to no effect to forest vegetation.

Foreseeable future vegetation treatments would include precommercial thinning and pruning on those acres where regeneration harvests are proposed. These activities would occur approximately 15 to 20 years after planting has taken place. The need for these activities would be determined after stocking and survival surveys are completed and stocking levels are calculated. Reoccurring activities would include fuelwood gathering, Christmas tree cutting, and activities associated with recreation. These activities would have a negligible cumulative effect.

Under the proposed action, commercial and non-commercial management activities are designed to improve resilience to future disturbances on approximately 1,421 acres. Forest vegetation on the remaining acres of the project area would continue to follow the vegetative trends that are the result of past natural and management generated disturbances.

The proposed action would result in progression towards the future desired conditions for forest composition and forest structure.

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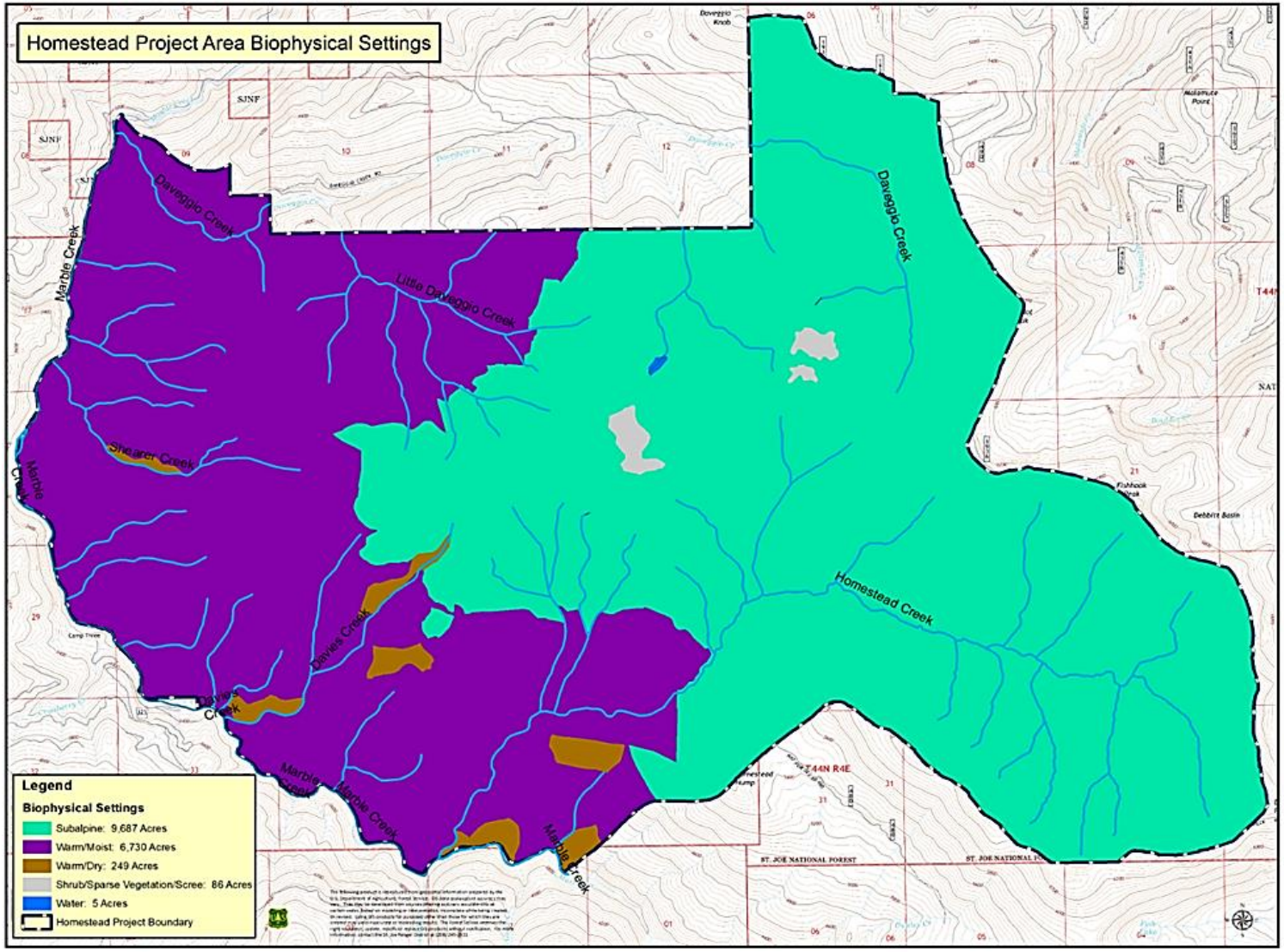
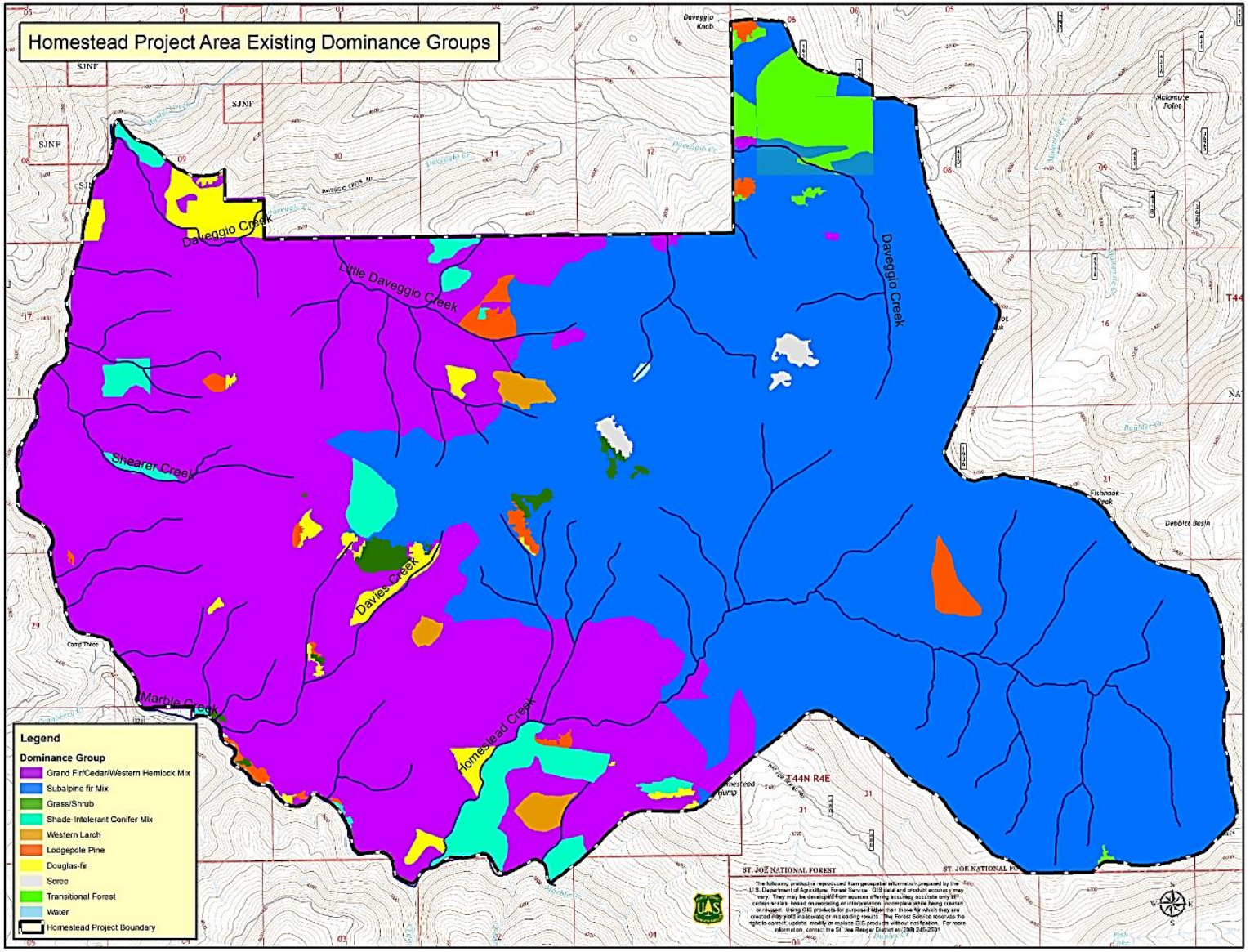
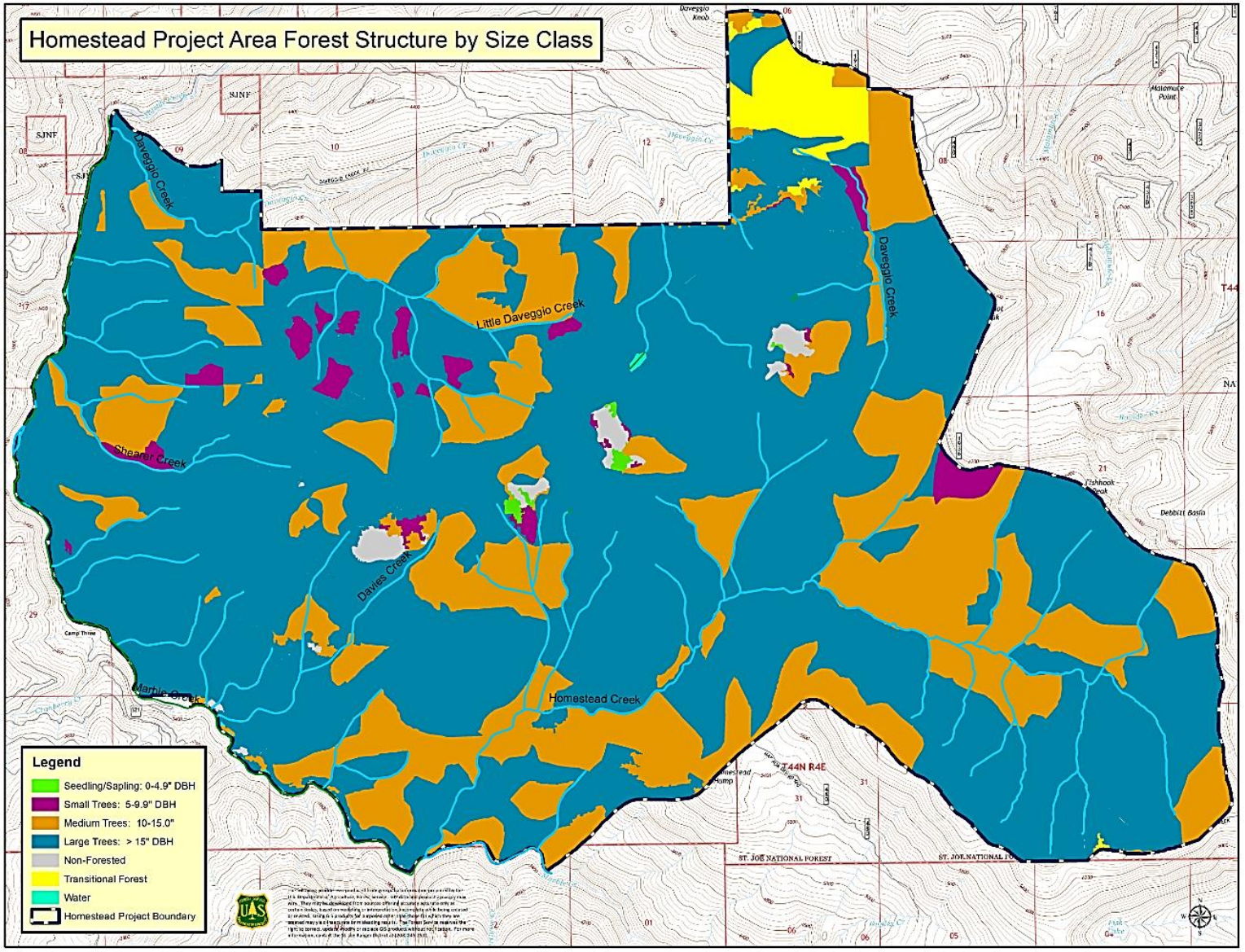
Appendix A – Maps



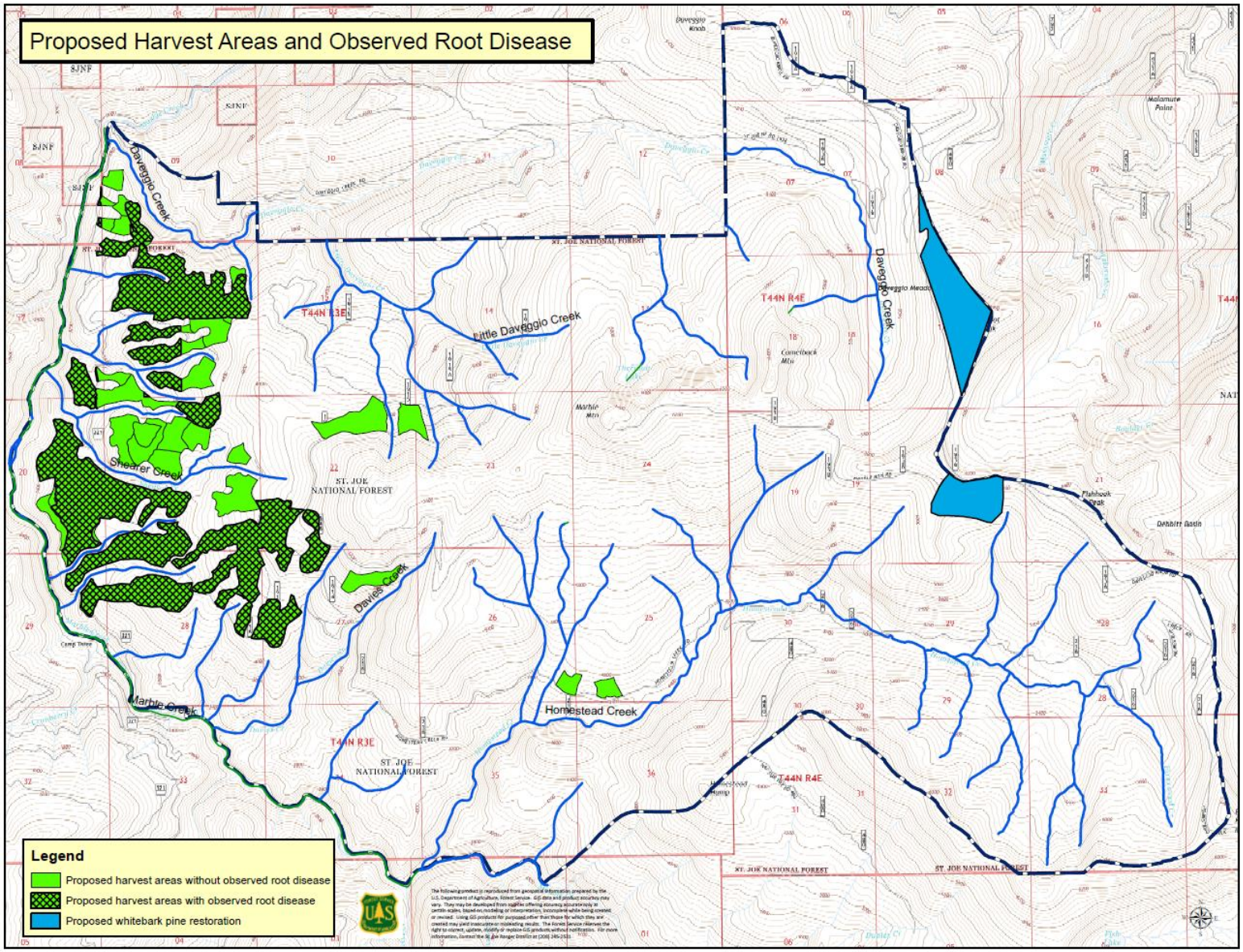
Map 1. Homestead project area biophysical settings.



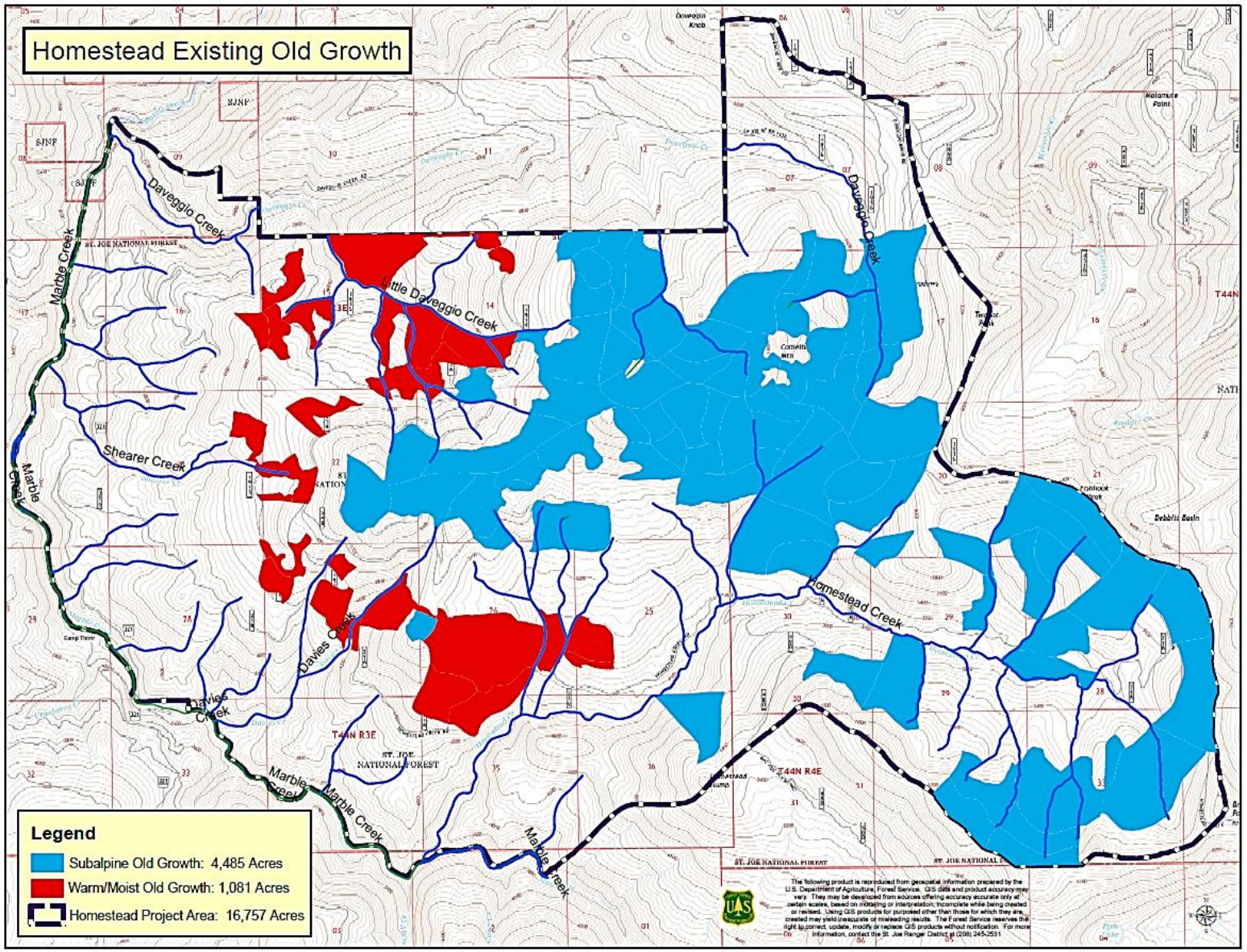
Map 2. Homestead Project Area Dominance Groups.



Map 3. Homestead project area size class distribution.



Map 4. Observed root disease associated with proposed harvest areas in the Homestead project area.



Map 5. Existing old growth within the Homestead project area.

Appendix B – Specific Unit Activity Information

Table 19: Vegetation Specific Unit Activity

Unit ID	Treatment Type	Treatment Acres	Logging System	Slash Treatment/Yarding	Temporary Road (miles)
1A	Seed-Tree	11	GB	Yard Tops/Grapple Pile	
1B	Seed-Tree	18	TLM	Yard Tops/Broadcast Burn	
2A	Clearcut with Reserves	5	GB	Yard Tops/Grapple Pile	
2B	Shelterwood	8	SL	Yard Tops/Broadcast Burn	
3	Irregular Shelterwood	16	GB	Yard Tops/Grapple Pile	0.26
4	Shelterwood	16	GB	Yard Tops/Grapple Pile	0.22
5A.1	Seed-Tree	29	GB	Yard Tops/Grapple Pile	
5A.2	Clearcut with Reserves	9	GB	Yard Tops/Broadcast Burn	
5A.3	Shelterwood	30	GB	Yard Tops/Grapple Pile	0.03
6A	Shelterwood	9	GB	Yard Tops/Grapple Pile	0.26
6B	Shelterwood	25	TLM	Yard Tops/Broadcast Burn	
7	Shelterwood	27	TLM	Yard Tops/Jackpot Burn	0.15
8	Shelterwood	36	GB	Yard Tops/Grapple Pile	
9A	Clearcut with Reserves	10	GB	Yard Tops/Jackpot Burn	
9B	Shelterwood	8	TLM	Yard Tops/Broadcast Burn	
10	Shelterwood	26	GB	Yard Tops/Grapple Pile	0.06
11A	Shelterwood	20	GB	Yard Tops/Grapple Pile	
11B	Clearcut with Reserves	10	TLM	Yard Tops/Broadcast Burn	
12	Shelterwood	24	GB	Yard Tops/Grapple Pile	
13	Shelterwood	8	GB	Yard Tops/Grapple Pile	0.03
14	Shelterwood	28	GB	Yard Tops/Grapple Pile	0.1
15	Commercial Thin	24	SL	Yard Tops/Broadcast Burn	0.25
16A	Commercial Thin	19	GB	Yard Tops/Grapple Pile	
16B	Shelterwood	24	GB	Yard Tops/Broadcast Burn	
17	Shelterwood	12	GB	Yard Tops/Broadcast Burn	
18A	Clearcut with Reserves	15	SL	Yard Tops/Broadcast Burn	0.09
18B	Seed-Tree	19	SL	Yard Tops/Broadcast Burn	

Unit ID	Treatment Type	Treatment Acres	Logging System	Slash Treatment/Yarding	Temporary Road (miles)
19	Clearcut with Reserves	19	GB	Yard Tops/Jackpot Burn	
20	Shelterwood	36	GB	Yard Tops/Grapple Pile	0.24
21	Seed-Tree	85	GB	Yard Tops/Grapple Pile	0.32
22	Seed-Tree	18	GB	Yard Tops/Grapple Pile	0.10
23	Commercial Thin	7	GB	Yard Tops/Grapple Pile	0.03
Unit ID	Treatment Type	Treatment Acres	Logging System	Slash Treatment/Yarding	Temporary Road (miles)
24	Shelterwood	16	GB	Yard Tops/Grapple Pile	
25A	Seed-Tree	41	GB	Yard Tops/Grapple Pile	0.11
25B	Seed-Tree	13	SL	Yard Tops/Broadcast Burn	
26	Irregular Shelterwood	51	GB	Yard Tops/Grapple Pile	0.05
27	Irregular Shelterwood	27	GB	Yard Tops/Grapple Pile	
28	Clearcut with Reserves	28	GB	Yard Tops/Grapple Pile	0.03
29	Shelterwood	44	GB	Yard Tops/Grapple Pile	0.27
30	Seed-Tree	92	GB	Yard Tops/Grapple Pile	
31A	Seed-Tree	20	GB	Yard Tops/Grapple Pile	
31B	Seed-Tree	29	SL	Yard Tops/Broadcast Burn	
32A	Clearcut with Reserves	6	GB	Yard Tops/Grapple Pile	
32B	Clearcut with Reserves	19	SL	Yard Tops/Broadcast Burn	
33	Clearcut with Reserves	9	GB	Yard Tops/Grapple Pile	
34	Clearcut with Reserves	36	GB	Yard Tops/Grapple Pile	
35	Clearcut with Reserves	20	SL	Yard Tops/Broadcast Burn	
36B.1	Clearcut with Reserves	40	SL	Yard Tops/Broadcast Burn	
36B.2	Clearcut with Reserves	18	SL	Yard Tops/Broadcast Burn	
37	Seed-Tree	8	SL	Yard Tops/Broadcast Burn	
40	Shelterwood	33	GB	Yard Tops/Grapple Pile	0.22
42.1	Clearcut with Reserves	10	GB	Yard Tops, TBD	
42.2	Clearcut with Reserves	10	GB	Yard Tops, TBD	